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ON SOME APPROACHES TO THE E-LIBRARY DEVELOPMENT

Abstract

This paper presents some peculiarities of e-library creation and development. We pursue the aim of recording, documenting, preserving, and safeguarding the documentary heritage. To support new experiences for the target audience we disclose digital virtual resources of scientific heritage to users. Web design perspectives are dwelled upon. We provide a comprehensive web solutions package for optimization of the learning process. Our work presupposes installing and testing different sites for multi-browser compatibility and troubleshoots. In the paper we discuss the number of design issues arisen in the process of transferring an existing Web site for cultural-scientific heritage to mobile devices. This paper attempts to establish the documented content, form and attributes of records; and it assesses the digitization requirements.

1. A framework for digitization at university

1.1 Introduction

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At the Ukrainian technical university we are aiming at creating an e-library of scientific heritage and indigenous knowledge; developing effective on-line learning perspectives for university library users. Chasing this aim some security problems are being solved.

1.2 Strategies

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The UNESCO¹ provides guidelines for safeguarding documentary heritage: its aim is to safeguard the world's documentary heritage, democratize access to it, and raise awareness of its significance and the need to preserve it. In Ukraine there is hardly any system of recording, documenting and preserving indigenous information, let alone a mechanism for capturing it to cope with dynamic world needs. Digitization is ideal for sharing, exchanging, educating, and preserving indigenous knowledge, cultures (IK) and scientific heritage (SH). This requires a clear design for metadata and standards procedures, multimedia technologies, as well as appropriate structures for access and

use. Our aim is also to develop an e-library at the Ukrainian technical university in cooperation with some other establishments digitizing not only scientific heritage but also indigenous knowledge. Our partners in Ukraine are the Kyiv University of culture, the Ukrainian historical museum in Dnipropetrovsk, governmental establishments, and others.

2. The metadata and standards

2.1 Standard systems

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We try to use existing systems, ranging from the traditional cataloguing approaches of Machine Readable Cataloguing (MARC), Anglo American Cataloguing Rules, 2nd (AACR2), and WorldCat Online Computer Library Centre (OCLC on-line Union catalogue). The other approaches include the United States MARC (USMARC), Online Public Access Catalogues (OPACs), Web OPAC, Matchbox, and Dublin Core that facilitate network resource information retrieval.² Recently, a team of metadata researchers visiting Quinkan rock art in Cape York, Australia, proposed a collaboration with Quinkan Culture elders.³ The team developed a cataloguing system, using Dublin Core (DC) Metadata – to describe, collect, and represent Quinkan culture. The description produced can be represented completely in Hypertext Markup Language (HTML), written in plain text with tags; and the content, in the Resource Description Framework (RDF).⁴ Weibel⁵ defines the Dublin Core elements as title, creator, subject, description, publisher, contributor, date, type (category), format, identifier, source, language, relationship to other resources, coverage, and rights. Hunter classifies metadata requirements for multimedia as bibliographic metadata and formatting metadata that include structural, content, events and rights.⁶ At the National Library of Education in the USA, Sutton and Oh⁷ identified the variables of a gateway to educational materials to include systematic metadata profile, syntax and well-specified practices (standards), prototype interfaces, harvesting tools for retrieving (multimedia), and organisational structure and use. On the Web, recording the Unique Resource Identifier (URI), Universal Resource Locator (URL), Universal Resource Names, (URN), and Universal Resource Characteristics (URC) is a fundamental requirement for the bibliographic description of networked resources.⁸ The URI, for instance, is the primary work of the Dublin Core Metadata Element Set (DCMES). Domain-specific ontologies have been developed by two different International Organisations for Standards (ISO) working groups to standardize the semantics associated with the description of museum objects and multi-media content.⁹ However, neither a single ontology nor a metadata model exists for describing indigenous knowledge and scientific heritage multimedia content.

3. Multimedia Technologies

3.1 Multimedia Techniques

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Technologies include images, audio, video, and multimedia.¹⁰ Image technologies consist of photographs, prints, manuscripts, documents, drawings, paintings, movie stills, and posters. Audio technologies include songs, music, plays, interviews, oral histories, radio programs, speeches, lectures, performances, language recordings. Video/film technologies include full features, documentaries, news clips, anthropological/expedition footage, home movies, animation; whereas multimedia include presentations and slide shows.¹¹

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The Digitization Centre of the Ukrainian State Chemical Technology University USCTU has developed a set of inexpensive, simple, and robust software tools designed to enable description, annotation and rights management related to collections of mixed media digital and physical objects in various categories. This institution has also developed a search, retrieval, and presentation interface which retrieves different result sets, and aggregates the results automatically into coherent multimedia so called Synchronized Multimedia Integration Language (SMIL) (synchronised) presentations. The developers recommend that design requirements for software include a security mechanism, a simple interface, robustness, low cost, interoperability, portability, flexibility, and scalability.¹² According to them, software tools should be built on international standards such as Dublin Core, in order to ensure maximum interoperability between disparate databases. They also recommend an additional security mechanism such as XML Encryption, XML Digital Signatures (XML Digital), Security Assertion Mark-up Language (SAML), Secure Sockets Layer (SSL), and watermarking techniques.¹³

3.2 Structures for Access and Use

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One way of ensuring IK developments in Ukraine is to establish documentation units and networks where recorded information is stored and made available for use by all those who wish to access proper data. For example, in Australia, various networks, including the Australian Cultural Network (CAN), Government Information Locator Services (GILS), Environmental Resources Information

Network (ERIN), The Education Network of Australia (EdNA), Australian and New Zealand Land Information Council (AZLIC), and the Australian Geological Survey Organization (AGSO), have

attempted digitization of community IK.¹⁴ Similarly, the Land Data Bank System in Sweden and the New York Computerized Criminal History System in the USA facilitate the sharing of information among various systems.¹⁵ That is why it is important to define a distributed digital access strategy, search/discovery services, interfaces, and information systems or gateways. In fact we suggest a system to register, index, search, and make reports. Technology has made information more available to more people, but at the same time it has made access to it more difficult.¹⁶ The major concern is how to adapt these technologies to meet the needs of the developing world.¹⁷ We believe that proper marketing of IK systems, products and services will promote the accessibility and usage of IK information in developing countries.

4. Methodology

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A qualitative research design was adopted, and the SH institutions and IK organizations with the aim of collecting data. Interviews, observations and document analysis were the main data collection methods. The respondents of the study were IK information managers, skilled personnel, government officials, and community and institutional leaders. Interviews were conducted with the Heads of programs on culture, library and archives. Some steps were made to observe the way information is documented in EU countries, in particular the National Library of CZ, historical and traditional sites were visited. The analysis of documents of the institutions' brochures, strategic plans, finding aids, Web sites, and company files was made. The data were analyzed and presented according to the main theme of the study, including the institutions that keep IK information, the content of IK, the records kept about IK, and the digitization requirements for IK.

5. Findings

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The study identified places which manage IK information, analyze the whole volume of its content, data records; as well as make requirement digitization. Educational institutions in Ukraine are attempting to transfer indigenous knowledge to the students in a number of fields. At Ukrainian State Technological University and also at Ukrainian State University of Culture and Arts the Departments of History, Music, Dance and Drama are involved. For example, the Department of Music, Dance and Drama trains specialist teachers to be performers, composers, choreographers, and playwrights using traditional dances. On its part, Information Science has introduced

palaeography, oral history and tradition, museum, preservation and conservation, and archives management to its curriculum.

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The Ukrainian National strategy is to promote the use of Tele-centres in Ukraine with the aim of enabling communities in remote places to more access to information on the global network. IT is also currently promoting the adoption of the System to involve people in health care delivery and the fight against HIV/Aids. However, although initiatives are focused on the preservation of culture heritage, there are difficulties in collecting, storing, preserving, co-ordinating and enabling access to IK information in Ukraine.

6. Observations

6.1.1 The Need for Digitization

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There is no institution responsible for coordinating the collection, management, use and proper utilization of IK, but there is an uncoordinated mechanism available among the IK institutions to share community IK. The semblance of partnership available lacks guidelines/policy for the proper utilization and preservation of IK. The Ministry of Labour and Social Development has attempted to set standards and to produce guidelines for the preservation of IK. A number of policies to guide IK in Ukraine, a number of proposals have been made; although the government has proposed legislation on Freedom of Access to Information and a National Information and Communication Policy, none of these guidelines provide a strategy for digitization of IK in Ukraine.

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There is a lack of institutional registers in most institutions and communities. These registers are necessary to record such information as Ukrainian traditions, customs and cultures, legal documents governing cultures, institutions, indigenous technology and medicine. No standard scheme is available to define the content, format and attributes of records about IK. In addition, there is a need for a national register of information concerning various cultures; this is a prerequisite to any machinery/policy to monitor its implementation.

6.1.2 Format of Records

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The majority of the institutions keep information in the form of a catalogue or use other finding aids manually. For example, the majority of Libraries record their holdings in the form of Card catalogues, book catalogues, Accession lists, and bibliographies. In the National Archives, there are a number of finding aids, including catalogues, index cards, accession registers, repository

lists, storage lists. Although the majority of institutions had access to on-line services and the Internet, there was little information on IK kept there. University Library had access to CD-ROMs, OPAC and the Internet for keeping information about Ukrainian culture and scientific knowledge of most of the educational establishments. Tapes, compact cassettes, digital audio-tapes are used to record information on IK.

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The majority of respondents agreed with a proposition for digitization although most of them had not computerized their own records and IKs. In libraries, digitization was envisaged to facilitate retrieval, indexing, and cataloguing of information materials. Digitization helps locate information since it is kept in files. Some of the institutions have Web sites. For example, the Internet can be used when accessing University databases with current faculty affairs. Digitization would help to access and co-ordinate information to ease locating and retrieving information. We want to have a networked database of all libraries (audio-visual or book materials) that keep IK, SH information. The organizations would build a library management system to facilitate easy access to information on IK. Digitization would facilitate research, and information would be centred in one place.

6.1.3 Co-ordination

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According to the study, there is a need for a central coordinating body – having one central place where people can look for IK. There was a demonstrable need to coordinate IK, SH in record centres, archives and libraries, museums, art galleries, traditional institutions. In fact, the University Library recommended the establishment of a consortium of IK institutions to enable the sharing of textbooks, journals and theses on information about IK.

6.1.4 Facilities and Resources

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It was observed that a strategy to obtain funds from government and non-governmental organizations should be devised. Government should be urged to increase its funding commitments to the development and management of cultural and IK information. It was felt crucial

that institutions and organizations establish registries and Archival centers with proper access and finding aids. Establishing IK resource centers at different communities with modern information and communication services would facilitate the digitization of IK.

6.1.5 Preservation of IK

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There was an expressed need for promotion and preservation of Ukrainian culture. The need for promoting cultural heritage, encouraging living cultures and creativity, and ensuring standards to monitor and to safeguard the documentary heritage was expressed. The Kyiv University of Art and Culture pledged to establish ethnic galleries at district levels. The materials collected would include photographs and videotapes. The legal and ethical intellectual property rights, and cultural restrictions would be invested in a government policy-making body.

6.2 Institutions that keep IK Information

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A number of efforts has been made in the promotion of community IK in Ukraine with varying degrees of success. The institutions that have made efforts include the Museum of Ukrainian history, National Committee of Science and Technology, Kyiv University of Arts, National Archives, various cultural centers, the Technical university library. The Technical Library of Dnepropetrovsk State University of Chemical Engineering (DSUCE) participates in the promoting of reading culture. It acts as a depository of national and foreign documents (not only technical ones), and compiles and publishes a national bibliography. This role has been the responsibility of the University Library from the time Ukraine got independency. Currently, Kyiv University of Arts Library keeps general literature on Ukrainian culture: books, papers, letters, notices, reports, diaries of events, church memoranda, registers, and manuscripts that are important to Ukraine's heritage. Its materials date back to the late nineteenth Century. The National Archives offers research service and enriches the cultural heritage of the country. It preserves and disposes of records and archives, and makes records available for consultation.

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The Department of Antiquities and Museums is responsible for historical, archaeological and palaeontological sites within Ukraine. These include traditional sites, buildings, signposts, and tombs. It is concerned with conservation, research and preservation of sites. The over-all aim of this department is to develop such sites into educational purposes for the people of Ukraine as well

as for interested foreign visitors. The specific objectives include preserving, conserving, promoting and presenting the national cultural heritage.

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Educational institutions in Ukraine are attempting to transfer indigenous knowledge to the students in a number of fields. At DSCE University, Kyiv University of Arts, the Departments of History, and Music, Dance and Drama are involved. The Ukraine National Community of Science and Technology with the assistance of some private funds is promoting the use of community Tele-centres to enable communities in remote places to make access to information on the global network. USUCE is also currently promoting the work on creating effective on-line learning techniques. Some work has been done in the fields of selected disciplines for students of the distant learning department.

7. Conclusion

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The digitization helps finding trends in various IK and investigating social, economic, political and cultural relationships as well as those between IK record attributes. The digitization of community IK may be linked to driving a vehicle that requires an engine and wheels (ICTs), the body (Community), passengers (Content), the driver (information Professionals, experts, IK Managers, etc), and driving and traffic policies (standards, ICT policies). Digitization requires the metadata showing locations for content (e.g. communities, sites, traditions, medicines, and subjects). A policy guideline for the digitization of IK and SH is a priority. The requirement analysis has to be made for the overall feasibility of the project in Ukraine.

8. Strategies for the Digitization of Community IK

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8.1 A secretariat for IK should be established for the administration of IK management and preservation in Ukraine. This will be responsible for setting standards, registration of IK, acquisition of funds for projects in IK, and provision of reports on IK on behalf of the Government.

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8.2 National and community or institutional committees responsible for capturing IK in Ukraine should be established to bring together the stakeholders in a particular IK. A national register of all IK should be compiled by the secretariat. This will require a nomination form of what should be included in the Register.

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8.3 Preservation should be given a priority in IK management. Policy guidelines on the preservation and conservation of IK in Ukraine should be drafted and presented by the responsible ministry. Institutions need to be aware of preservation techniques and approaches. Preventive measure, reformatting or reproduction techniques including photocopying, microfilming, recording and digitizing have to be enhanced.

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8.4 A bibliographic control that requires all partners to participate needs to be maintained by the national committee. This will require a database of both national and community or institutional registers that have controlled access to users. Conservators and archivists should come out and join hands with Ukraine Library Association to produce a code of ethics which should establish limits on cost of access, form of access and relationship between owners and custodians of the IK. Policies on copyrights, cultural restrictions and public investment in private IK management need to be clearly stated. Forms of distribution and product identification and control need to be observed in the policy. When digitizing, there is a need to put in place technical and usage standards for various functions like scanning or data compressions/reduction.

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8.5 The digitization of community IK needs a marketing and awareness strategy as a priority approach. The importance must be attached to promote the program to target groups, raising funds, making copies of IK in various formats: micro images, audio tapes, films, videos and digital representations in various languages. Promotional materials need to be developed. Exhibitors and displays of IK, articles in newspapers, and the formation of strategic alliances with other partners, including museums, galleries, park sectors, tourism, etc., need to be encouraged. Promotion and publicity for stakeholders, together with education and training for staff and implementers, are prerequisites to the success of the project.

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8.6 There is a need for curriculum review and development at all levels of the educational system in Ukraine. Schools should introduce simple preservation techniques of IK at various levels. Training institutions in the areas of library and information science should introduce IK curriculum and short courses to cover IK management systems, digitization of IK and preservation and

conservation of IK. The institutions that keep and store IK should organize sensitization seminars and workshops to promote.

9. Recommendations

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9.1 Digitization of IK suggests not only that the technology is available, but also that it is appropriate for the promotion of IK in Ukraine at the moment. There is a need for first developing the culture of preserving IK, together with a thorough awareness campaign and sensitization programs for the appropriate adoption and utilization of IK.

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9.2 Information requirement analysis is necessary for the creation and integration of new technologies in the management and preservation of IK. A cost benefit analysis for application of digitization is a priority. Financial models and methodologies need to be developed to specify the baseline conditions and requirements, strategic implementation plan, benefits determination, security and risk analysis.

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9.3 At the organizational level, database management systems technologies are essential before the adoption of digitization; developmental support must be offered by various organizations.

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9.4 The Traditional Knowledge and ecological functions must be emphasized to create a functional digital IK in the country.

10. Results and perspectives

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In the process of recording, documenting, preserving, and safeguarding the documentary heritage we have already got some results – the working group has digitized the most valuable sources and now it is in open access for professors and students of the University. Some work concerning on-

line interactive learning at Technical University is still being held. To support new experiences for the target audience we expose users to digital virtual resources of scientific heritage. The concept of interoperability and multi-channel Web applications is attempted to be introduced. Some problems arise with web design. We provide a comprehensive web solution package for optimizing the process of studying. Our work presupposes installing and testing different sites for multi-

browser compatibility and troubleshoots bugs. All the work is in progress and much is still to be done. We would like to discuss design issues arisen in the process of transferring an existing Web site for cultural-scientific heritage to mobile devices.

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We give an overview of both the potential and the limits of mobile technology and note the implications for application design. The paper focuses on the problems of phishing (anti-phishing) and identity theft countermeasures. Our security group technology is part of a complete package. It includes a sophisticated risk/threat engine as part of their adoptive authentication product. Just like the credit card companies use data mining to pick out fraudulent transactions based on signals and fuzzy data, it also gives the ability to assign a good/bad score to an IP address and the risk that it may be an attacker and not the real customer. If a naive attacker did deploy a phishing site similar to the one we have demonstrated in this page, it is quite likely that RSA would very quickly suspect that something bad was happening – simply due to the fact that hundreds of different users' SiteKeys would all be requested from the same IP address.

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We made attempts to establish the documented content, form and attributes of records, and an assessment of the digitization requirements. The further process of digitization should be aimed at improving methods and at developing new technologies in the way of creating the comprehensive systems of e-library functioning.

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